REMARKS

In view of the above amendments and the following remarks, reconsideration of the rejections and further examination are requested. Upon entry of this amendment, claims 21 and 27 are amended, leaving claims 21 and 27 pending with claims 21 and 27 being independent. No new matter has been added.

Double Patenting

Claim 21 is provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 6 of co-pending Application No. 10/532672 in view of Shintani, Kawakusu, and further in view of Furuya or Shiokawa and Nishimura.

Applicants respectfully request that the double patenting rejection be held in advance, until the claims of this application are otherwise allowed.

Rejections Under 35 U.S.C. §103(a)

Claims 21 and 27 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Shintani (JP 11-080952) in view of Okuyama et al. (JP 2001-243886), Kawakusu et al. (JP 2000-277009) and Furuya (JP 09-295894).

Applicants submit that the claims as now pending are allowable over the cited prior art. Specifically, amended independent claim 21 recites a method of manufacturing a plasma display panel (PDP) comprising a process of forming a metal oxide film made from magnesium oxide onto a substrate of the plasma display panel, the process of forming the metal oxide film comprising controlling a degree of vacuum and a partial pressure of a predetermined gas in a deposition room within a certain range, introducing oxygen gas into the deposition room and controlling a partial pressure of the oxygen gas within a range from $3x10^{-3}$ Pa to $3x10^{-2}$ Pa, so as to suppress oxygen deficiency in the metal oxide film, and introducing another gas to increase oxygen deficiency in the metal oxide film, the another gas including at least one gas selected from the group consisting of carbon monoxide and carbon dioxide into the deposition room, wherein when the another gas includes carbon monoxide, controlling a partial pressure of the carbon monoxide within a range from $1x10^{-3}$ Pa to $5x10^{-2}$ Pa, and wherein when the another gas includes carbon dioxide, controlling a partial pressure of the carbon dioxide within a range from $1x10^{-4}$ Pa to $3x10^{-3}$ Pa.

Therefore, in the method recited in claim 21, the oxygen gas that suppresses the oxygen deficiency in the metal oxide film, together with the at least one gas selected from carbon monoxide and carbon dioxide as the gas for increasing the oxygen deficiency in the metal oxide film, are controlled individually, and the control range of the partial pressure in each gas is controlled. As a result, the oxygen deficiency amount in the metal oxide film is controlled, and a stable protective film is achieved.

The cited prior art fails to disclose or render obvious such a method. In particular, Shintani discloses a process for forming an MgO film onto a substrate, in which the degree of vacuum in a deposition room is maintained in a prescribed range, the oxygen gas partial pressure in the deposition room is detected, and the introduction amount of oxygen gas is controlled by a gas introduction amount control means (MFC), and thereby the oxygen partial pressure is maintained in a prescribed range.

Okuyama discloses a process for forming an MgO film onto a substrate, in which H_2O, CO, and CO_2 contained in the introducing gas are used as impurities, and the level of these impurities in a decompressed atmosphere is kept under 110 ppm. In the Okuyama deposition process, when controlling the crystal orientation or crystal particle size of the MgO film, H_2 or N_2 is preferred, and for decreasing the oxygen deficiency in the MgO film, oxygen gas is preferred.

Kawakusu discloses a process for forming an MgO film onto a substrate, in which the oxygen partial pressure in the deposition process is controlled in the range of 1 x 10-5 to 1 X 10-4 Torr (1.33 x 10-3 to 1.33 X 10-2 Pa).

Furuya discloses a process for forming an MgO film onto a substrate, in which the hydrogen partial pressure is controlled in the range of 1 x 10-3 to 1 X 10-4 Torr (1.33 x 10-2 Pa to 1.33 x 10-1 Pa), and hydrogen gas or steam is supplied alone, or along with oxygen gas, in a prescribed amount.

However, each of these cited references clearly fails to disclose increasing the oxygen deficiency in the metal oxide film, or controlling and introducing at least one gas selected from carbon monoxide and carbon dioxide, as required by claim 21 of the present invention.

Moreover, Applicants submit that there is no reasoning in prior art to modify these references or the combination thereof such that the proposed combination would have rendered claim 27 obvious.

Applicants submit that amended independent claim 27 is allowable for similar reasons to those set forth above. Namely, the cited prior art fails to disclose or render obvious an apparatus for manufacturing a plasma display panel (PDP) comprising a gas-introducing means for introducing a first gas containing oxygen gas to suppress oxygen deficiency in a metal oxide film and a second gas to increase oxygen deficiency in the metal oxide film, the second gas including at least one gas selected from the group consisting of carbon monoxide and carbon dioxide into a deposition room, a partial-pressure detecting means for independently detecting a partial pressure of the first gas and the at least one gas of the second gas in the deposition room, a control means for controlling an amount of the first gas and the second gas to be introduced into the deposition room and an amount of evacuation from the deposition room based on information supplied from the partial-pressure detecting means and information supplied from a degree of vacuum detecting means such that the partial pressure of the first gas and the second gas is within a controlled range, and the degree of vacuum in the deposition room can fall within a given range.

Claims 21 and 27 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Shintani in view of Okuyama, Kawakusu, and Shiokawa et al. (U.S. 2003/0077972).

Applicants submit that the claims as now pending are allowable over the cited prior art, since Shiokawa fails to overcome the deficiencies of Shintani, Okuyama, and Kawakusu discussed above. In particular, Shiokawa discloses a process for forming an MgO film onto a substrate, in which the steam partial pressure is kept under 10 mPa (1 x 10-2 Pa) to suppress the water absorption property of the MgO film effectively.

Thus, it is clear that the combination of Shintani, Okuyama, Kawakusu, and Shiokawa fails to disclose or render obvious increasing the oxygen deficiency in the metal oxide film, or controlling and introducing at least one gas selected from carbon monoxide and carbon dioxide, as required by the claim 21 of the present invention, or means for performing these functions as required by claim 27.

Claims 21 and 27 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Shintani in view of Okuyama, Kawakusu, and Shiokawa and in further view of Nishimura et al. (U.S. 2004/0135506).

Applicants submit that the claims as now pending are allowable over the cited prior art,

since Shiokawa fails to overcome the deficiencies of Shintani, Okuyama, Kawakusu and Shiokawa discussed above. In particular, Nishimura discloses introducing at least one gas of carbon dioxide or steam, other than inert gas, and adsorbing on a phosphor layer, before sealing the periphery of the substrate, for the purposes of enhancing characteristics, such as lowering the discharge voltage of the plasma display panel, stable discharge, high luminance, high efficiency, and long life. The Examiner contends that Nishimura, in Fig. 2 and paragraphs [0019], [0034], and [0037], discloses a method of introducing impurity gases before sealing the periphery of the substrate, and disagrees with the position that the MgO film is exposed to these impurity gases because the MgO film forming step (protective film forming) takes place before the sealing step.

However, in Nishimura, the protective film (MgO film) is formed at a front panel forming step A, while the impurity gas adsorbing step takes place during a rear panel forming step B (*see* Fig. 2). In Nishimura, the impurity gas adsorbing step 17 is intended to absorb the impurity gas on the phosphor layer and the protective film forming step 13, shown in a region enclosed by the dotted lines in Fig. 2, is described in paragraph [0037]. That is, Nishimura states that "the glass substrate at the front side is formed by vacuum electron beam deposition method of magnesium oxide used as a protective film." Therefore, the MgO film in Nishimura is already formed at the front panel forming step A before the sealing step, and is free from effects of the impurity gas adsorbing step 17 at the rear panel forming step B.

Therefore, Applicants submit that the combination of Shintani, Okuyama, Kawakusu, Shiokawa and Nishimura fails to render independent claims 21 and 27 obvious, since none of the cited references alone or in combination disclose or render obvious controlling and introducing oxygen for suppressing the oxygen deficiency in the metal oxide film, and at least one gas selected from carbon monoxide and carbon dioxide for increasing the oxygen deficiency, or means to perform these functions. Therefore, Applicants submit that independent claims 21 and 27 are allowable over the cited prior art.

Conclusion

In view of the foregoing amendments and remarks, all of the claims now pending in this application are believed to be in condition for allowance. Reconsideration and favorable action are respectfully solicited.

Should the Examiner believe there are any remaining issues that must be resolved before this application can be allowed, it is respectfully requested that the Examiner contact the undersigned by telephone in order to resolve such issues.

Respectfully submitted,

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January 28, 2010